2012 REMOVAL ACTION WORK PLAN

Avery Landing Site, St. Joe River Road

Avery, Idaho

Prepared for:

Western Federal Lands Highway Division
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ACRONYMS AND ABBREVIATIONS

AMEC	AMEC Environment & Infrastructure, Inc.
ARARs	applicable or relevant and appropriate requirements
ASAOC	Administrative Settlement Agreement and Order on Consent
B.M.	Boise Meridian
BTEX	benzene, toluene, ethylbenzene, and total xylenes
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COCs	constituents of concern
Ecology	Washington State Department of Ecology
EE/CA	Engineering Evaluation/Cost Analysis
EPA	United States Environmental Protection Agency
FH	Forest Highway
FHWA	Federal Highway Administration
IDTLs	initial default target levels
LNAPL	light nonaqueous phase-liquid
MTBE	methyl tertiary butyl ether
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
PAHs	polycyclic aromatic hydrocarbons
PCBs	polychlorinated biphenyls
PID	photoionization detector
Potlatch	Potlatch Corporation
QAPP	quality assurance project plan
RPA	Robert Peccia and Associates, Inc
RSLs	EPA Regional Screening Levels
SAP	sampling and analysis plan
TPH	total petroleum hydrocarbons
VOCs	volatile organic compounds
WAC	Washington Administrative Code
WFLHD	Western Federal Lands Highway Division
Work Plan	*2012 Removal Action Work Plan*

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Avery, Idaho

1.0 PURPOSE

AMEC Environment & Infrastructure, Inc. (AMEC), and Robert Peccia and Associates, Inc. (RPA), have prepared this *2012 Removal Action Work Plan* (Work Plan) on behalf of Western Federal Lands Highway Division (WFLHD) of the Federal Highway Administration (FHWA). This Work Plan describes a removal action to address petroleum hydrocarbon contamination on the highway right-of-way within the Avery Landing Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) site (site). The removal action is designed as a response to the United States Environmental Protection Agency (EPA) for FHWA to address petroleum hydrocarbons that are in the subsurface within the right-of-way on Forest Highway (FH) 50 owned by the United States of America (hereafter "Government"). This Work Plan describes removal action activities to be performed on the Government administered portion of the site (the highway right-of-way).

EPA has identified contamination of soils and groundwater in an area along the St. Joe River in Idaho historically known as the Avery Landing Railway Yard (Figure 1). Soil and groundwater at the site are known to contain petroleum hydrocarbons and other hazardous substances (primarily related to hydrocarbon impacts), apparently associated with the site's historical use as a railroad roundhouse and maintenance facility (Ecology and Environment, 2010). Petroleum hydrocarbons at the site are discharging to the St. Joe River in violation of the Clean Water Act. In addition, substances subject to the CERCLA have been found at the Railroad Yard Site. EPA is leading the CERCLA removal action for the entire site to address contamination associated with the former railroad yard. Within the site, a plume of light nonaqueous phase-liquid (LNAPL) extends from the northern edge of the site toward the St. Joe River. Releases to the St. Joe River have occurred and are still occurring as a result of migration of petroleum hydrocarbons. The petroleum constituents consist primarily of petroleum hydrocarbons in the diesel and Bunker oil range. These petroleum constituents are present on FHWA portion of the site along the original railroad grade right-of-way located along the northern edge of the Avery Landing site. This property was acquired by the Government for construction and expansion of FH 50.

EPA has completed an Engineering Evaluation/Cost Analysis (EE/CA) (Ecology and Environment, 2010) and developed a draft Action Memorandum (Action Memo) that outlines the preferred approach for cleanup of the contamination at Avery Landing (EPA, 2011). The Action Memo was approved on July 5, 2011. FHWA and EPA are proposing an agreement to address petroleum hydrocarbon

contamination on the Government portion of the site as part of a cost reimbursement agreement, in which EPA will conduct the site cleanup activities. As part of the proposed agreement, FHWA performed an additional environmental investigation to further characterize the nature and extent of contamination within the highway right-of-way (AMEC Geomatrix, Inc., 2011a, 2011b), and prepared this *Work Plan* to address the contamination.

1.1 WORK PLAN LAYOUT

This Work Plan has been prepared for EPA to use in site cleanup actions, which will be performed by the EPA as part of a reimbursement agreement with FHWA. Information obtained from the earlier Right-of-Way Investigation (AMEC Geomatrix, Inc., 2011a) was used to design the removal action to be implemented in order to address contamination under the highway right-of-way. The removal action will include excavation of contaminated soil and disposal of soil at an off-site landfill. The Work Plan package consists of two parts:

1. 2012 Removal Action Work Plan (this document), including a confirmation sampling plan; and
2. Construction Package, including design drawings and specifications.

This Work Plan contains the information necessary to explain the intent of the removal action to the EPA. As part of the Work Plan, the consultant team has also prepared design drawings and specifications for the removal action. The drawings have been developed to a level that can be utilized by EPA in completing the removal action. A Confirmation Sampling Plan is included in the Work Plan in Section 5.

1.2 REMOVAL ACTION OBJECTIVES

Objectives for this removal action include removal of petroleum-contaminated soils from the highway right-of-way and disposal of the excavated soil at an off-site landfill. The removal action is designed to meet performance criteria established in this document.

2.0 NATURE AND EXTENT OF CONTAMINATION

This section summarizes historical and recent investigations at the site in order to identify the current nature and extent of contamination on the highway right-of-way property.

2.1 LOCATION

The Avery Landing site is located in the St. Joe River Valley in the Bitterroot Mountains in northern Idaho, 1 mile west of the town of Avery in Shoshone County (Figure 1). The site is directly adjacent to the St. Joe River, which abuts the site to the south, and includes a portion of FH 50 to the north. The site is located within the northeast quarter of Section 16, Township 45 North, Range 5 East, Boise Meridian (B.M.), and the northwest corner of Section 15, Township 45 North, Range 5 East, B.M.

2.2 PREVIOUS SITE INVESTIGATIONS

Soil and groundwater characterization has been performed at the site during several historical investigations, including, most recently, an EPA Removal Assessment (Ecology and Environment, Inc., 2007) and field investigations conducted by Potlatch Corporation (Potlatch) (Golder, 2009, 2010). The results of these and former investigations are summarized in an EE/CA performed for the site by the EPA (Ecology and Environment, Inc., 2010). Field work for the EE/CA was performed by Potlatch under a 2008 Administrative Settlement Agreement and Order on Consent (ASAOC) with EPA (EPA, 2008) (Golder, 2009, 2010).

These investigations indicated that a petroleum plume consisting primarily of bunker oil and diesel is present in subsurface soil and groundwater and is migrating toward, and discharging to the St. Joe River. The oil and diesel were likely released during historical site activities when the site was occupied by a railroad roundhouse, maintenance, and fueling facility. Other contaminants at the Avery Landing site include polycyclic aromatic hydrocarbons (PAHs), volatile organic compounds (VOCs), and polychlorinated biphenyls (PCBs). These constituents, likely related to the rail yard operations and co-mingled with the LNAPL plume, have been detected in the Potlatch portion of the site. Petroleum hydrocarbons at the site are discharging to the St. Joe River in violation of the Clean Water Act. In addition, substances regulated under CERCLA have been found on the outside and down gradient from the FH 50 ROW. A plume of LNAPL extends from the northern edge of the site toward the St. Joe River. Releases to the St. Joe River have occurred and are still occurring as a result of migration of petroleum hydrocarbons.

2.3 PREVIOUS ACTIONS

Potlatch has conducted several interim remedial activities at the Avery Landing site. In the late 1980s, Potlatch removed and disposed of a former 500,000-gallon aboveground fuel tank and any remaining contents located on the northeast corner of the site (partially on the Government-owned

portion of the site). Beginning in 1994, Potlatch captured groundwater and free LNAPL in trenches installed along the St. Joe River. From 1994 until 2000, the untreated groundwater was processed through an oil/water separator and then re-injected through a re-infiltration trench running along the north side of FH 50.

2.4 CURRENT NATURE AND EXTENT OF CONTAMINATION

A data gaps investigation was performed by AMEC in September 2011 (AMEC Geomatrix, Inc., 2011a,b) to evaluate the nature and extent of petroleum hydrocarbon contamination in soil on the highway right-of-way within the Avery Landing site, to determine the presence/absence and extent of hydrocarbons requiring cleanup, and to provide data suitable to evaluate alternatives and design a final removal action for cleanup of the right-of-way. To meet these objectives, AMEC advanced 11 boreholes on the highway right-of-way at the locations shown on Figure 2. AMEC collected soil samples from the boreholes for hydrocarbon analysis, performed sheen tests, and measured the thickness of LNAPL in the boreholes. Results are reported in full in a separate data report (AMEC Geomatrix, Inc., 2011a).

During the investigation, LNAPL was measured at thicknesses of 0.05 foot and less than 0.01 foot above the water in boreholes BH-101 and BH-102, respectively. LNAPL was not observed on the water in any other boreholes. Positive sheen test results were identified on soil from boreholes BH-101, BH-102, BH-104, BH-105, and BH-106. Petroleum hydrocarbons (diesel and oil range) were detected in laboratory samples collected from at least one interval from each of the 11 borings on the highway right-of-way, except borings BH-103, BH-107, and BH-108. Field observations indicate that visual impacts of petroleum are limited to the eastern portion of the site, surrounding and just downgradient of the former fuel tank area. Sampling intervals with elevated concentrations of petroleum hydrocarbons in laboratory samples did not necessarily exhibit a positive sheen test, suggesting that petroleum hydrocarbons at these intervals are likely highly weathered and not mobile. These low-mobility hydrocarbons are unlikely to pose a risk to the St. Joe River. In general, the highest concentrations of petroleum hydrocarbons were observed in borings just downgradient of the location of the former 500,000-gallon fuel tank on the southern side of the highway right-of-way portion of the site.

Analytical data for total petroleum hydrocarbons (TPH), field observations of visual impacts, and measurements of LNAPL for boreholes advanced on the highway right-of-way during subsurface investigations are summarized in Table 1. A map of the petroleum plume has been developed based on areas where positive sheen test results or LNAPL were observed during historical investigations (Ecology and Environment, Inc., 2010) and the data gaps investigation report (AMEC Geomatrix, Inc., 2011a) (Figure 3). The identified plume represents the estimated extent of impacts of petroleum deemed to present an ongoing risk to groundwater based on EPA's criteria for hydrocarbon mobility

(see Section 3.2.1). The plume appears to be centered on the area surrounding and just downgradient of the location of the former 500,000-gallon AST. A section showing the extent of visual impacts and analytical results for TPH in soil is provided in Figure 4.

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3.0 REMOVAL ACTION SCOPE AND DESCRIPTION

The scope of the proposed removal action has been developed to prevent the discharge of petroleum product to the St. Joe River and to reduce concentrations of hazardous substances at the site to acceptable levels based on human health and ecological risk criteria. The action is being conducted as a water quality cleanup action under the Clean Water Act as amended by the Oil Pollution Act.

The scope of the removal action corresponds to the following removal factors identified in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP):

- 40 CFR 300.415(b)(2)(i), which identifies "actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances or pollutants or contaminants;" and
- 40 CFR 300.415(b)(2)(ii), which identifies "actual or potential contamination of drinking water supplies or sensitive ecosystems."

Based on the scope of the removal action, the following removal action objectives have been developed for the site:

- Remove, treat, and/or manage petroleum free product that is present as LNAPL on surface water or groundwater;
- Remove, treat, and/or manage soil contaminated by the petroleum free product to prevent human and ecological exposures to risk-based concentrations by direct contact and incidental ingestion; and
- Dispose of waste streams (contaminated soil and other waste generated during cleanup) in accordance with EPA requirements.

Contaminated soils present on the highway right-of-way are anticipated to be removed during the removal action and replaced with clean fill material, such that the potential for human health exposure and migration of contaminants to the St. Joe River is prevented. Performance criteria for the removal action are described in this section.

3.1 DESCRIPTION OF PROPOSED ACTION

Excavation and off-site disposal has been selected as the recommended removal action alternative by the EPA (Ecology and Environment, Inc., 2010). Contaminated soil not meeting cleanup criteria will be excavated, loaded into haul trucks, and transported to an off-site disposal facility licensed to accept the material. Excavation is an effective method for physically removing contaminated subsurface material from the site, involves the use of standard construction equipment, and imposes few limitations on the types of waste that can be excavated and removed.

Plans and specifications for construction are provided in full in the FHWA construction package [ID PFH 50(9)]. The clean overburden present above the zone of contamination would be excavated, stockpiled on site, and subsequently used for backfill operations upon completion of excavation. Based on existing data, it is assumed that excavation would extend to a maximum depth of 20 feet below ground surface (bgs). Excavation of the contaminated soils should be initiated in the upgradient portion of the LNAPL plume area and completed in the downgradient portion to prevent recontamination of backfilled soils.

Prior to backfilling, confirmation soil samples will be collected in accordance with the confirmation sampling plan provided in Section 5.0. Results from the confirmation samples will be used to evaluate compliance with the cleanup objectives and to assess whether additional soil removal would be necessary. Excavated areas will then be backfilled with stockpiled overburden and/or clean backfill pending results of confirmation soil testing. The highway portion of the right-of-way will be restored to the existing line and grade once final grading is complete. Excavated areas will be backfilled with clean fill material. Rock borrow will be placed below the groundwater surface and fill material will be placed above the rock borrow to allow for proper compaction in areas under the highway. FH 50 will be rebuilt to the plans and specifications provided in the construction package [ID PFH 50(9)] prepared by FHWA.

3.1.1 Excavation Rationale

Soil that does not meet site performance criteria will be removed from the site to make the site suitable for unrestricted use. Performance criteria, including applicable or relevant and appropriate requirements (ARARs), are provided in Section 3.2.

3.1.2 Quantity of Material for Removal

The LNAPL plume within the highway right-of-way has an estimated area of approximately 1 acre. Soil contaminated with LNAPL and TPH is encountered at depths ranging from 3 to 20 feet bgs. Detailed cross sections, provided in the construction package, were developed. Using the data presented in the construction package, the volume of contaminated soil expected to be removed and disposed of was calculated to be approximately 17,000 cubic yards (in place). In addition, approximately 12,000 cubic yards (in place) of clean soil are anticipated to be excavated and replaced during the removal action.

It should be noted that the volumes for removal should be considered approximate based on road construction as-built plans and profiles. The actual quantities removed are expected to vary because of such variables as actual water table, bedrock depth, and conditions encountered in the field, including the presence or absence of visible petroleum impacts.

3.2 PERFORMANCE CRITERIA

Performance criteria for the removal action are described in this section. This section focuses on performance criteria necessary for the determination of the final extent of the excavation area. This section defines criteria to delineate those soils that must be removed from the site. Additional performance criteria for construction and site restoration are defined in the construction package.

3.2.1 ARARs

The Clean Water Act, as amended by the Oil Pollution Act, prohibits the discharge of oil affecting natural resources belonging to the United States in such quantities as are determined by the EPA to be harmful. The EPA has determined that a "harmful quantity" of oil is defined as follows (40 CFR § 110.3):

> *For the purposes of section 311(b)(4) of the Act, discharges of oil in such quantities that the Administrator has determined may be harmful to the public health or welfare or the environment of the United States include discharges of oil that:*
>
> *(a) Violate applicable water quality standards; or*
>
> *(b) Cause a film or sheen upon or discoloration of the surface of the water or adjoining shorelines or cause a sludge or emulsion to be deposited beneath the surface of the water or upon adjoining shorelines.*

Idaho state regulations do not provide specific soil screening levels for TPH. For the purposes of this removal action, the presence of hydrocarbons at quantities sufficient to produce a sheen, sludge, or measurable LNAPL is considered to be a likely ongoing source of impacts to down-gradient groundwater and potentially to the St. Joe River. Therefore, based on EPA requirements, quantities of oil producing a sheen, sludge, or measurable LNAPL are considered to be a harmful quantity, as oil in these quantities is likely to represent an ongoing source to down-gradient groundwater and the St. Joe River. Soil that does not contain visible impacts and that does not fail the sheen test is unlikely to pose a risk to the river and could be left in place based on federal and state regulations.

In addition, the following ARARs for soil cleanup are consistent with federal and Idaho state law and will be applied to the FHWA portion of the site:

- The *Idaho Risk Evaluation Manual* (Idaho Department of Environmental Quality, 2004) provides standards for soil in the State of Idaho, including initial default target levels (IDTLs) in soil for constituents other than petroleum. IDTLs are the most conservative medium-specific levels, and meeting these levels allows unrestricted (residential) use of the property. Since exposure to these low levels of contaminants does not pose a threat to human health, their application does not require the evaluation of site-specific exposure pathways, the development of a site conceptual model, or any land-use restrictions. These IDTLs will be used as screening levels for soil excavation on the highway right-of-way, except when the IDTL is higher than the applicable federal standard; and

- EPA Regional Screening Levels (RSLs): No RSLs specific to Region 10 are available. EPA RSLs have been harmonized for Regions 3, 6, and 9 and will be applied as screening levels for the FHWA right-of-way (http://www.epa.gov/region9/superfund/prg/).

Residential and industrial soil screening levels consistent with these federal and Idaho state regulations are provided in Table 2.

Excavation is planned to proceed to remove hydrocarbon contamination from the right-of-way upon which time confirmation samples will be collected. The purpose of these samples is to confirm that contaminants are removed to the point that the risk of exposure to human health or the environment is at an acceptable level as determined by EPA under the Removal Action.

No constituents other than petroleum have been measured at levels exceeding site screening levels in samples collected from historical borings (BH-1 through BH-5) advanced on the highway right-of-way (Ecology and Environment, 2010). During a 2009 field investigation conducted by Potlatch and summarized in the EE/CA, concentrations of PCBs were found to be below the laboratory detection limit. Concentrations of carcinogenic and non-carcinogenic PAHs were measured at concentrations below site screening levels and frequently below detection, in samples from these borings (Golder, 2009; Ecology and Environment, 2010).

The results of confirmation sampling will be presented in an As-Built Report to document that the cleanup is complete.

4.0 REMOVAL ACTION IMPLEMENTATION

The implementation of the removal action on the highway right-of-way will be performed by EPA in accordance with the specifications provided in the accompanying construction package. The EPA will manage stormwater, erosion control, and dewatering on a site-wide basis, including treatment, testing and discharge of all site stormwater and groundwater. The EPA will additionally manage disposal of contaminated site soils at a licensed landfill permitted to accept these contaminated soils. EPA will also manage excavated soil including stockpiles. Confirmation sampling will be conducted by the EPA in accordance with the accompanying construction package and the confirmation sampling plan included in Section 5.0. EPA will produce an As-Built Report for the highway right-of-way portion of the site that documents volumes of soil excavated, volumes of soil disposed of including documentation of landfill (bills of lading), and all confirmation sampling results.

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5.0 CONFIRMATION SAMPLING PLAN

Confirmation soil samples will be collected from the bottom and sides of the excavation. EPA will perform all confirmation sampling, including submitting confirmation samples to an accredited laboratory and performing field screening during excavation activities. Confirmation sampling will be conducted consistent with a sampling and analysis plan (SAP) and quality assurance project plan (QAPP) to be developed by the EPA for the EPA-led CERCLA project. EPA will report results of confirmation sampling and field screening to FHWA based on the requirements and schedule outlined in Section 6.0.

The condition of excavated soils will be assessed visually for discoloration and odor and screened in the field for volatile organic vapors using a photoionization detector (PID). The field screening results will be documented in field notes. After completion of the removal activities, soil conditions in the excavations will be assessed. Based upon the volume of the excavated soils, confirmation soil samples will be collected from the sidewalls and the bases of each excavation and from stockpiled soils. Sidewall samples will be collected from the depth level where previous analytical results had identified the presence of constituents of concern (COCs). If that information is not available, then the samples will be collected from near the middle of the sidewall.

Confirmation soil samples will be collected from the bottom of the excavation at a density of one sample every 5,000 square feet, and from the sidewalls at a rate of one sample per 300 linear feet of sidewall. Sidewall samples will be collected from the depth level where previous analytical results had identified the presence of COCs. If that information is not available, then the samples will be collected from a depth near the midpoint between the base of the excavation and the ground surface. Since the excavation of the rest of the Removal Action Site will continue southward beyond the right-of-way, side wall confirmation samples will not be collected from the downgradient side wall (southern sidewall).

Confirmation soil samples will be submitted by EPA for testing for indicator hazardous substances. Soil samples will be collected from undisturbed soil as much as possible using the excavator bucket to safely access soils where necessary. The sample containers will be filled using decontaminated spoons, except for soil samples for analyses of benzene, toluene, ethylbenzene, and total xylenes (BTEX), which will be collected in accordance with EPA 5035A sample collection methods.

Samples will be analyzed for the following constituents using the following analytical methods:

- TPH-O and TPH-D using Washington State Department of Ecology (Ecology) Method NWTPH-Dx (Ecology, 1997). The samples will undergo silica-gel/acid cleanup in order to remove biogenic interferences that may cause a high analytical bias;
- VOCs, including BTEX and methyl tertiary butyl ether (MTBE), by EPA Method 8260B;

- Semivolatile organic compounds, including low-level polycyclic aromatic hydrocarbons (PAHs), by EPA Method 8270D SIM; and
- PCBs by EPA Method 8082.

6.0 LONG-TERM MONITORING

No long-term monitoring is expected to be necessary following the removal action on the highway right-of-way, as impacted material likely to pose an exposure risk to human health or the environment is anticipated to be removed from the site. Confirmation sampling (Section 5.0) will be conducted as specified in this document to confirm that no contamination remains on site above removal action objectives following the removal action.

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7.0 REPORTING AND PROJECT SCHEDULE

The removal action is anticipated to be initiated and completed during 2012. All reporting is anticipated to be completed by January 2013.

A final construction report will be completed and submitted to FHWA by EPA once the removal action is complete. The construction report will include as-builts of the action and a photo log of construction activities. The report will include all confirmation sampling results in order to certify that performance specifications described in this document and in the construction package have been met.

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8.0 REFERENCES

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TABLES

TABLE 1

SUMMARY OF AVAILABLE TPH DATA[1,2]

Avery Landing Site, St. Joe River Road
Avery, Idaho

AMEC, 2011, DATA GAPS INVESTIGATION[3]

Boring ID	Sample Depth (feet bgs)	TPH-Diesel	TPH-Motor Oil	Depth to Wet Soil (feet bgs)	Depth(s) of Positive Sheen Test (feet bgs)	Thickness of LNAPL on Borehole Water (feet bgs)
BH-101	6.0	**584**	**2,510**	12.2	12, 12.5	0.05
	12.2	**388 J**	84.7 U			
	DUP [4]	**907 J**	71.5 U			
BH-102	6.0	**132**	72.7 U	8.5	9, 12, 14.5, 16.5	Less than 0.01
	9.0	**437**	**144**			
	13.5	**1,850**	**581**			
BH-104	5.0	**539**	**1,870**	11.9	12, 12.5, 16.5	None
	12	**55.1**	71.1 U			
	16.5	**296**	**112**			
BH-105	5.0	**605**	**2,870**	13	12.5	None
	12.5	**40.5**	72.6 U			
	16.5	17.4 U	69.5 U			
BH-106	5.0	**127**	**558**	10.3	12.5	None
	11.0	**8,350**	**2,690**			
	14.5	**763**	**188**			
BH-110	5.0	**127**	**446**	16	None	None
	16.5	19.0 U	76.1 U			
BH-111	5.0	**42.0**	**85.7**	15.7	None	None
	15.5	17.7 U	70.9 U			

HISTORICAL DATA[5]

Boring ID	Sample Depth (feet bgs)	TPH-Diesel	PH-Motor O	Water Table (feet bgs)	Visible TPH Depth (feet bgs)	Field Observations from Borehole Logs
BH-1	--	--	--	16	13-20	LNAPL in soil at 13 and 15-20 ft bgs. LNAPL on GW.
BH-2	--	--	--	15	15-20	Oil in sand 15-20 ft bgs. LNAPL on GW.
BH-3	--	--	--	15	7.5-15	Petroleum odor and sheen 10-11.5 ft bgs. LNAPL on GW.
BH-4	--	--	--	14.5	7.5-15	Petroleum odor and sheen 7.5 to 15 ft bgs.

TABLE 1

SUMMARY OF AVAILABLE TPH DATA[1,2]

Avery Landing Site, St. Joe River Road
Avery, Idaho

HISTORICAL DATA[5]						
Boring ID	**Sample Depth (feet bgs)**	**TPH-Diesel**	**PH-Motor O**	**Water Table (feet bgs)**	**Visible TPH Depth (feet bgs)**	**Field Observations from Borehole Logs**
BH-5	--	--	--	10	5-17	Petroleum odor and sheen 5-15 ft bgs. Sheen on GW.

Notes
1. Detected concentrations shown in **bold** type.
2. Data qualifiers are as follows:
   J = value is an estimate.
   U = not detected at the reporting limit listed.
3. Data are provided only for borings where visual evidence of TPH/LNAPL was observed or where TPH was detected above the laboratory detection limit.
4. Duplicate sample collected with BH-101 at depth of 12.2 feet.
5. Data obtained from Ecology and Environment, 2010.

Abbreviations
-- = not analyzed
bgs = below ground surface
GW = groundwater
LNAPL = light nonaqueous phase-liquid
mg/kg = milligrams per kilogram
TPH = total petroleum hydrocarbon

TABLE 2

SOIL SCREENING LEVELS

Avery Landing Site, St. Joe River Road
Avery, Idaho

Constituent	Idaho IDTL (mg/kg)	EPA RSL	
		Resident Soil (mg/kg)	Industrial Soil (mg/kg)
SVOCs			
1,2,4-Trichlorobenzene	0.692	22	99
1,2-Dichlorobenzene	5.25	1,900	9,800
1,3-Dichlorobenzene	0.229	--	--
1,4-Dichlorobenzene	0.0755	2.4	12
1-Methylnaphthalene	--	22	99
2,4,5-Trichlorophenol	7.38	6,100	62,000
2,4,6-Trichlorophenol	0.00436	44	160
2,4-Dichlorophenol	0.0978	180	1,800
2,4-Dimethylphenol	0.819	1,200	12,000
2,4-Dinitrophenol	0.0384	120	1,200
2,4-Dinitrotoluene	0.00029	1.6	5.5
2,6-Dinitrotoluene	0.000212	61	620
2-Chloronaphthalene	128	--	--
2-Chlorophenol	0.365	390	5,100
2-Methylnaphthalene	3.31	310	4,100
2-Methylphenol	1.8	--	--
2-Nitroaniline	0.0725	610	6,000
2-Nitrophenol	--	--	--
3- and 4-Methylphenol	0.141	61	620
3,3'-Dichlorobenzidine	0.00183	1.1	3.8
3-Nitroaniline	0.00318	--	--
4,6-Dinitro-2-methylphenol	--	6.1	62
4-Bromophenyl phenyl ether	0.00545	--	--
4-Chloro-3-methylphenol	--	--	--
4-Chloroaniline	0.126	--	--
4-Chlorophenyl phenyl ether	--	--	--
4-Nitroaniline	--	--	--
4-Nitrophenol	0.226	--	--
Acenaphthene	52.3	3,400	33,000
Acenaphthylene	78	--	--
Anthracene	1040	17,000	170,000
Benzo[a]anthracene	0.422	0.15	2.1
Benzo[a]pyrene	0.0422	0.015	0.21
Benzo[b]fluoranthene	0.422	0.15	2.1
Benzo[g,h,i]perylene	1180	--	--
Benzo[k]fluoranthene	4.22	1.5	21
Benzoic acid	77.1	240,000	2,500,000
Benzyl alcohol	6.43	6,100	62,000
Bis(2-chloroethoxy)methane		180	1,800
Bis(2-chloroethyl)ether	0.000108	0.21	1
Bis(2-chloroisopropyl) ether	3.11	--	--

TABLE 2

SOIL SCREENING LEVELS

Avery Landing Site, St. Joe River Road

Avery, Idaho

Constituent	Idaho IDTL (mg/kg)	EPA RSL	
		Resident Soil (mg/kg)	Industrial Soil (mg/kg)
SVOCs (Continued)			
Bis(2-ethylhexyl) phthalate	11.8	35	120
Butyl benzyl phthalate	511	260	910
Carbazole	--	--	--
Chrysene	33.4	15	210
Dibenz[a,h]anthracene	0.0422	0.015	0.21
Dibenzofuran	6.1	78	1,000
Diethyl phthalate	27.5	49,000	490,000
Dimethyl phthalate	271	--	--
Di-n-butyl phthalate	31	6,100	62,000
Di-n-octyl phthalate	1830	--	--
Fluoranthene	364	2,300	22,000
Fluorene	54.8	2,300	22,000
Hexachlorobenzene	0.0427	0.3	1.1
Hexachlorobutadiene	0.0378	6.2	22
Hexachlorocyclopentadiene	0.0116	370	3,700
Hexachloroethane	0.138	12	43
Indeno[1,2,3-cd]pyrene	0.422	0.15	2.1
Isophorone	0.14	510	1,800
Naphthalene	1.14	3.6	18
Nitrobenzene	0.0218	4.8	24
N-Nitrosodi-n-propylamine	1.81E-05	0.069	0.25
N-Nitrosodiphenylamine	0.088	99	350
Pentachlorophenol	0.00907	0.89	2.7
Phenanthrene	79	--	--
Phenol	7.36	18,000	180,000
Pyrene	359	1,700	17,000
VOCs			
1,1,1-Trichloroethane	2	8,700	38,000
1,1,2,2-Tetrachloroethane	0.000915	0.56	2.8
1,1,2-Trichloroethane	0.0141	1.1	5.3
1,1-Dichloroethane	3.48	3.3	17
1,1-Dichloroethene	0.0388	240	1,100
1,2-Dichloroethane	0.00767	0.43	2.2
cis-1,2-Dichloroethene	--	700	9,200
trans-1,2-Dichloroethene	--	700	9,200
1,2-Dichloropropane	0.0089	0.94	4.7
cis-1,3-Dichloropropene	--	--	--
trans-1,3-Dichloropropene	--	--	--
2-Butanone	11.8	28,000	200,000
2-Hexanone	--	210	1,400
4-Methyl-2-pentanone	17.6	5,300	53,000

TABLE 2

SOIL SCREENING LEVELS

Avery Landing Site, St. Joe River Road
Avery, Idaho

Constituent	Idaho IDTL (mg/kg)	EPA RSL	
		Resident Soil (mg/kg)	Industrial Soil (mg/kg)
VOCs (Continued)			
Acetone	17.4	61,000	630,000
Benzene	0.0178	1.1	5.4
Bromodichloromethane	0.00268	0.27	1.4
Bromoform	0.0292	62	220
Bromomethane	0.0501	7.3	32
Carbon disulfide	5.97	820	3,700
Carbon tetrachloride	0.0114	0.61	3
Chlorobenzene	0.618	--	--
Chloroethane	0.0533	--	--
Chloroform	0.00564	0.29	1.5
Chloromethane	0.0231	120	500
Dibromochloromethane	0.00202	0.68	3.3
Dichlorodifluoromethane	2.96	94	400
Ethylbenzene	10.2	5.4	27
Methylene chloride	0.0169	11	53
Styrene	1.83	6,300	36,000
Tetrachloroethene	0.0288	0.55	2.6
Toluene	4.89	5,000	45,000
Trichloroethene	0.00288	0.91	6.4
Trichlorofluoromethane	10.4	790	3,400
Vinyl chloride	0.00963	0.06	1.7
Xylenes (total)	1.67	630	2,700
m,p-Xylene	--	590	2,500
o-Xylene	--	690	3,000
PCBs			
Aroclor 1016	2.33	3.9	21
Aroclor 1221	0.00294	0.14	0.54
Aroclor 1232	--	0.14	0.54
Aroclor 1242	0.00318	0.22	0.74
Aroclor 1248	0.137	0.22	0.74
Aroclor 1254	0.74	0.22	0.74
Aroclor 1260	0.147	0.22	0.74

Abbreviations
-- = not established
EPA = U.S. Environmental Protection Agency
IDTL = Idaho Default Target Level
mg/kg = milligram per kilogram
PCBs = polychlorinated biphenyls
RSL = regional screening level
SVOCs = semivolatile organic compounds
VOCs = volatile organic compounds

FIGURES

Note: Base map from U.S.G.S. Avery and Fishhook Creek, Idaho Quadrangles (7.5' Map Series)

N

0 1,000 2,000 Feet

VICINITY MAP
Avery Landing Site
St. Joe River Road
Avery, Idaho

By: APS	Date: 01/12/12	Project No. 16011
amec		Figure 1

S:\16011\002_2012 RemovalAction\WP\GIS\Avery_VicinityMap_011212.mxd

BH-110		
Depth	TPH-D	TPH-O
5.0	127	446
16.5	ND	ND

BH-107		
Depth	TPH-D	TPH-O
5.0	ND	ND
18.3	ND	ND

BH-111		
Depth	TPH-D	TPH-O
5.0	42.0	85.7
15.5	ND	ND

BH-108		
Depth	TPH-D	TPH-O
5.0	ND	ND
12.5	ND	ND

BH-109		
Depth	TPH-D	TPH-O
6.0	114	324
18.2	ND	ND

BH-104		
Depth	TPH-D	TPH-O
5.0	539	1,870
12	55.1	ND
16.5	296	112

BH-105		
Depth	TPH-D	TPH-O
5.0	605	2,870
12.5	40.5	ND
16.5	ND	ND

BH-106		
Depth	TPH-D	TPH-O
5.0	127	558
11.0	8,350	2,690
14.5	763	188

BH-103		
Depth	TPH-D	TPH-O
6.0	ND	ND
12.5	ND	ND
13.4	ND	ND
16.5	ND	ND

BH-102		
Depth	TPH-D	TPH-O
6.0	132	ND
9.0	437	144
13.5	1850	581

BH-101		
Depth	TPH-D	TPH-O
6.0	584	2,510
12.2	907 J	ND

SECTION 16
SECTION 15

R/W
Federal Highway Administration Property
HIGHWAY 50
FORMER 500 GALLON TANK LOCATION
BENTCIK PROPERTY
POTLATCH PROPERTY
ST. JOE RIVER

BH-107 BH-110 BH-109 BH-108 BH-111 BH-106 BH-105 BH-104 BH-103 BH-102 BH-101

TP-07 GA-3 TP-06 TP-05 TP-05N GA-2 TP-04 GA-4 DW-01 TP-03 TP-02 EMW-3 ESB-01 TP-01 HC-1R ESB-07 MW-11 TS-05 EMW-05 ESB-02 ESB-03 TS-04 TS-03 TP-2 EMW-06 HC-4 ESB-04 EW-3 ESB-05 ESB-06 TS-02 TS-01 BH-1 BH-2 BH-4 BH-3 BH-5 EMW-02 EW-4 MW-5 EMW-1 TS-06 GA-1 EMW-04 TP-08

Aerial courtesy of USDA Farm Services (June, 2009)

KEY

Sample I.D.

BH-109		
Depth	TPH-D	TPH-O
6.0	114	324
18.2	ND	ND

Sample depths reported in feet below ground surface

BOLD value indicates detection
Concentrations in milligrams per kilogram (mg/kg)

TPH-D = Total Petroleum Hydrocarbon - Diesel
TPH-O = Total Petroleum Hydrocarbon - Oil
ND = not detected above reporting limit

NOTE:

1. Historical test locations and plume boundaries have been estimated based on the following report:
   Ecology and Environment, Inc., 2010
   DRAFT ENGINEERING EVALUATION/COST ANALYSIS
   Avery Landing Site
   Avery, Idaho
   TDD: 08-05-0006
   and should be considered a rough approximation.

EXPLANATION

- SOIL BORING LOCATION (AMEC, 2011a)
- MONITORING/RECOVERY WELL LOCATION (2007)
- SOIL BORING LOCATION (2007,2009)
- DRINKING WELL LOCATION

SITE FEATURES

- CURRENT PROPERTY BOUNDARY
- HISTORIC POTLATCH PROPERTY LINE
- FHWA RIGHT-OF-WAY BOUNDARY (R/W)
- SECTION LINE (PROPERTY DIVISION LINE BETWEEN POTLATCH AND BENTCIK)

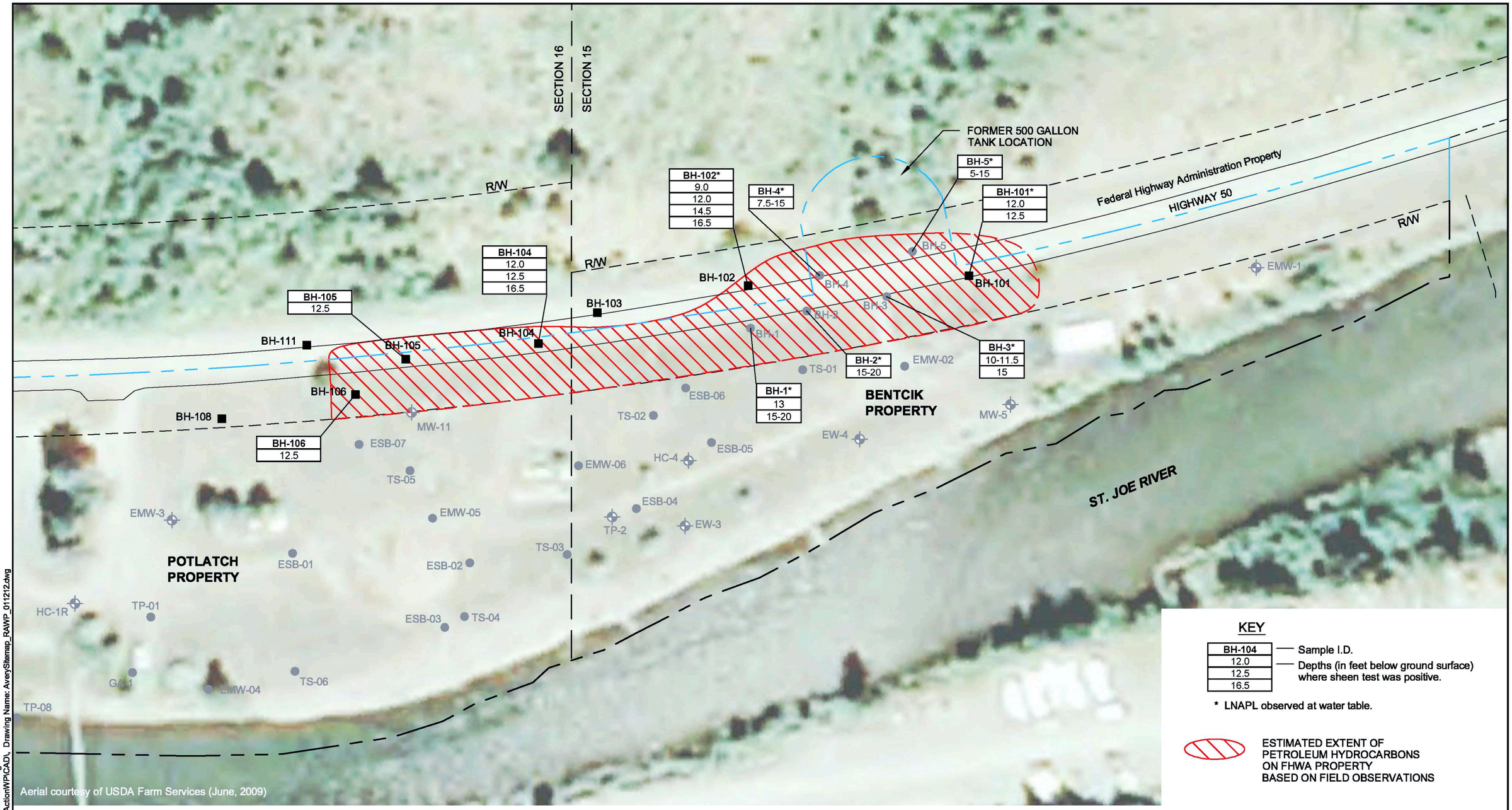
N

0 75 150
APPROXIMATE SCALE IN FEET

ANALYTICAL DATA FOR TPH
Avery Landing Site
St. Joe River Road
Avery, Idaho

By: APS	Date: 01/20/12	Project No. 16011
amec		Figure 2

Plot Date: 01/20/12 - 3:09pm, Plotted by: adam.sternberg
Drawing Path: S:\160\11002_2012 RemovalAction\WP\CADD\, Drawing Name: AverySitemap_BoreholeData_011212.dwg



KEY

BH-104
12.0
12.5
16.5

— Sample I.D.
— Depths (in feet below ground surface) where sheen test was positive.

* LNAPL observed at water table.

ESTIMATED EXTENT OF PETROLEUM HYDROCARBONS ON FHWA PROPERTY BASED ON FIELD OBSERVATIONS

NOTE:

1. Historical test locations have been estimated based on the following report:
   Ecology and Environment, Inc, 2010
   DRAFT ENGINEERING EVALUATION/COST ANALYSIS
   Avery Landing Site
   Avery, Idaho
   TDD: 08-05-0006
   and should be considered a rough approximation.

EXPLANATION

- SOIL BORING LOCATION (AMEC, 2011a)
- MONITORING/RECOVERY WELL LOCATION (2007)
- SOIL BORING LOCATION (2007,2009)
- DRINKING WELL LOCATION

SITE FEATURES

- CURRENT PROPERTY BOUNDARY
- HISTORIC POTLATCH PROPERTY LINE
- FHWA RIGHT-OF-WAY BOUNDARY (R/W)
- SECTION LINE (PROPERTY DIVISION LINE BETWEEN POTLATCH AND BENTCIK)

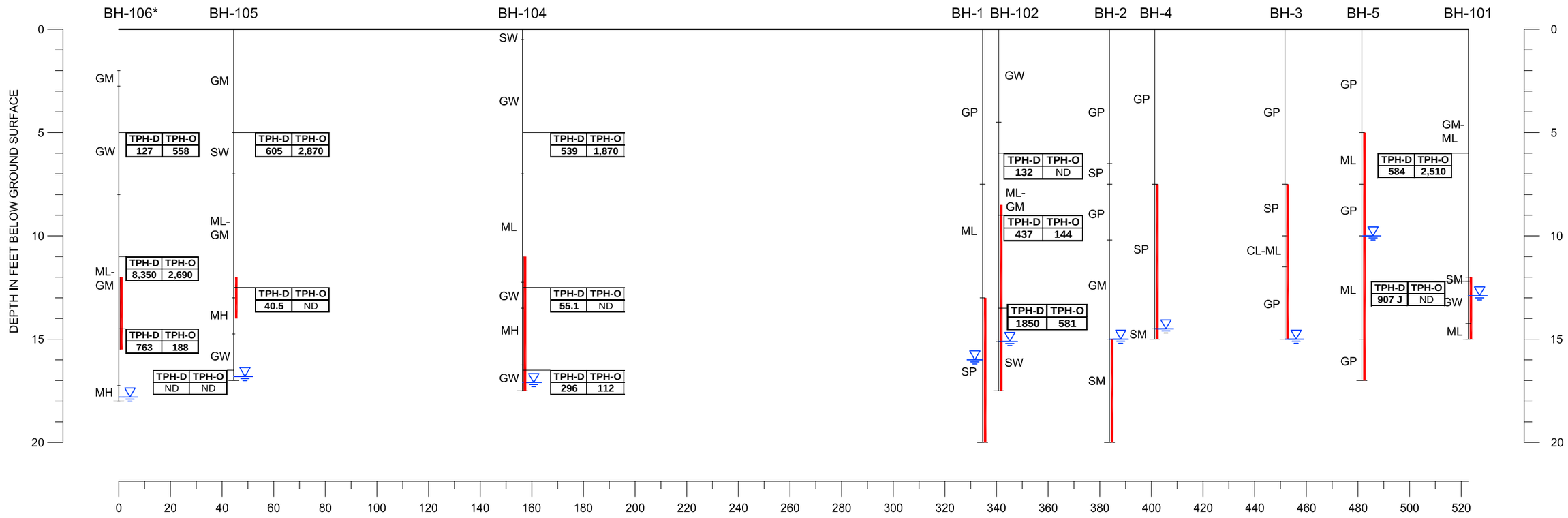
N

0 40 80
APPROXIMATE SCALE IN FEET

KNOWN EXTENT OF PETROLEUM HYDROCARBON PLUME (VISUAL IMPACTS)
Avery Landing Site
St. Joe River Road
Avery, Idaho

By: APS	Date: 01/20/12	Project No. 16011
amec		Figure 3

Plot Date: 01/20/12 - 3:10pm, Plotted by: adam.stenberg
Drawing Path: S:\16011\002_2012 RemovalActionWP\CAD\, Drawing Name: AverySitemap_RAWP_011212.dwg



KEY TO STRATIGRAPHY

GM	SILTY GRAVEL
GW	WELL GRADED GRAVEL
GP	POORLY GRADED GRAVEL
SP	POORLY GRADED SAND
SW	WELL GRADED SAND
SM	SILTY SAND
ML	SANDY SILT
MH	ELASTIC SILT

EXPLANATION

VERTICAL RED LINE INDICATES DEPTHS OF VISUAL IMPACTS

WATER LEVEL

* BH-106 STARTS APPROX. 2FT BELOW HIGHWAY SURFACE.

NOTES:

1. BH-1 THROUGH BH-5 WERE COLLECTED BY POTLATCH IN 2009.
2. SAMPLES FROM BH-101 THROUGH BH-106 WERE ADVANCED BY AMEC IN 2011.

DATABOX KEY

TPH-D	TPH-O
1850	581

BOLD value indicates detection
Concentrations in milligrams per kilogram (mg/kg)

TPH-D = Total Petroleum Hydrocarbon - Diesel
TPH-O = Total Petroleum Hydrocarbon - Oil
ND = not detected above reporting limit

CROSS SECTION OF PETROLEUM HYDROCARBON PLUME
Avery Landing Site
St. Joe River Road
Avery, Idaho

By: APS	Date: 01/20/12	Project No. 16011
amec		Figure 4

Plot Date: 01/20/12 - 3:13pm, Plotted by: adam.stenberg
Drawing Path: S:\16011\002_2012 RemovalAction\WP\CAD\, Drawing Name: AverySitemap_RAWP_011212.dwg